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ABSTRACT

This paper describes the major international agricultural information services, sources, and systems; outlines the existing information situation in Tanzania as it relates to problems of agricultural development; and reviews the improvements in information provision resources required to support the process of agricultural development in Tanzania. The types of information systems and services discussed include the Food and Agricultural Organization's (FAO) AGRIS and CARIS databases, the Commonwealth Agricultural Bureaux (CAB), a number of smaller international organizations, the U.S. National Technical Information Service (NTIS), and the U.S. National Agricultural Library. Local sources of research information in Tanzania are outlined, the need for an East African input center for AGRIS and the role of libraries in agricultural research are reviewed, and the need for a strengthening of national and international research and information infrastructures is discussed in detail. A 27-item reference list, a list of journals available from CAB, and a checklist on information infrastructure are included. (JL)

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INFORMATION FOR AGRICULTURAL DEVELOPMENT*

by

E.E. KAUNGAMNO

DIRECTOR OF TANZANIA LIBRARY SERVICE

The Role of Information

Research information is vital for agricultural development. The right information must be disseminated to the right people at the right time. Research information obtained within and/or outside Tanzania must be made known to all those who need it to enable them to keep abreast of the latest advances in their fields and to avoid costly duplication of research.

Information Explosion

However it is not easy for decision makers, planners, administrators and the like to get up-to-date information related to their work because of information explosion. By 1974, for example, there were 7 million productive research workers (including those in agriculture and related fields) throughout the world; the amount of research publications had reached 3 million journal articles, about 600,000 reports, 250,000 books, and 300,000 patents per year.[1] The table below shows the nature of the world of information and some information used to minimize difficulties of information users in general.[2]

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Feature of the World of Information	Users' difficulties	Information services
Generators and users of Information are usually located a distance apart	Awareness of Information generated difficulty	Current awareness services extension services, publications and publicity
Cummulation of information into vast quantities	Overabundance, need for selection	Indexing, classification and storage systems, reference services
Accelerated growth of information. Increasing rate of obselescence	Obtaining information quickly for specific problem area	Reviews state-of-the art and trend report digests, information analysis and evaluation
Interdisciplinary nature of information scatter	Can specialize only in a restricted subject field	Indexing techniques to interlink subjects Information analysis and enquiry entries
Multiplicity of languages	Can be familiar with only one or a few languages	Translation service
Wide range of standards and modes of presentation of ideas	Only some standards and patterns are convenient to some users	Obtaining copies of documents reprographic facilities

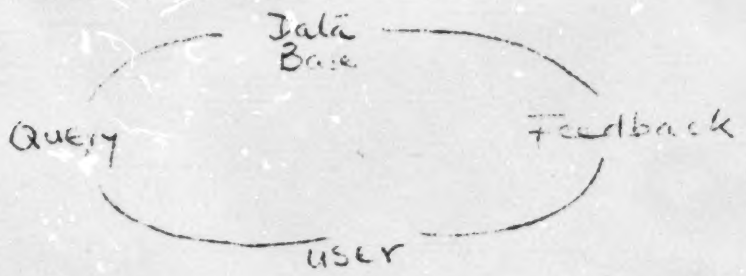
In any country, sources of information are many. These may be libraries, documentation units, archives, research institutions, etc. Dr. R.H. Maybury has summarized very well in the following schematic diagram[3].

...../3..

Sources of Scientific Information	Global Information Services eg. Agris (FAO)	Data Banks usually in Europe and North America	Research Laboratories	Libraries - University - National - Special
Information Processing	Information Analysis Centres			
Users	Government policy	R & D Laboratories	Training Institution	Users in the productive Sectors of economy: eg. - farmers - industries - commercial - & enterprises

Data banks

Data bases play a very fundamental role in storage, retrieval and dissemination of information. A simplified diagramatical presentation of on-line-information retrieval is as shown below:



In 1977 there were about 100 major on-line data bases. The number is growing every year. The problem of use caused by multiplicity of these data bases has made it necessary for the Committee on Data for Science and Technology (CODATA) to establish in France a World Data Referral Centre (WDRC) whose functions and services will include.[4]

(a) Collecting information concerning major resources of data related scientific information on a worldwide basis and constructing a file of this material for convenient retrieval.

(b) Preparing and disseminating documents to assist local and national services to conduct data referrals.

(c) Provide advice to local and national services on problems of data referral;

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(d) Performing data referrals on request from national and local services and when necessary, from individual inquirers.

In short the centre will seek to give guidance to data users on the availability and sources of the data they need; to provide a worldwide focus on referral activities and to improve all capabilities to answer scientific and technical questions, especially those involving data.

AGRIS AND RELATED INFORMATION SOURCES AND SYSTEMS[5]

The Food and Agriculture Organizations (FAO)

The Food and Agriculture Organization as an agency of the United Nations is a world source of information. It has established the following information systems:

(a) AGRIS International Information system for Agricultural Sciences and Technology which collects, and incorporates into its data base, information on agricultural sciences and technology procuced in participating member states. Each, participating country is responsible for maintaining a centre which prepares materials for input into system. FAO's responsibility includes the processing of this material and the distribution of the total file to the participating countries both in the form of magnetic tapes and a printed version called Agrindex. The AGRIS tapes, given the appropriate computer facilities, can be manipulated to provide current awareness services particularly selective disseminative of information (SDI), retrospective retrieval as well as the production of specialized bibliographies of a particular interest to the recipient nation.

(b) CARIS (Current Agricultural Research Information System). The CARIS current awareness service is an international information system which allows for the compilation organisation and dissemination of basic data on such fields of activity as agriculture and animal husbandry, foresty and the fishing and food industries, and principally on ongoing research programmes and activities in developing countries.

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(c) AGLINET (Agricultural Libraries Network)

This is a World Network of Agricultural Libraries intended to promote mutual and national exploitation of library resources for the benefit of the world's agricultural development through systematic collaboration among agricultural libraries. This is possible through an inter-library loan service (including photo-reproduction and bibliographic information. By October 1977, the International Centre of the AGLINET in Rome, indicated that seventeen major agricultural libraries around the world were participating in the inter-library network. The AGLINET centres in Agriculture, in Africa are the Library and Documentation Centre, Ibadan Nigeria, and the former East African Agriculture and Forest Research Organisation, Muguga, Kenya.

Commonwealth Agricultural Bureaux (CAB)[6]

The CAB, consisting of Institutes and Bureaux act as clearing houses of information for scientists and research workers in agriculture, animal health and forestry throughout the Commonwealth and increasingly, throughout the world. The Institutes and Bureaux collect information by scanning and indexing as far as possible all journals in their subjects. They distribute this information by the periodical issue of Abstract Journals, by the issue of monographs reviewing some particular subject within their field, by answering inquiries put directly by scientists and research workers thoughout the Commonwealth and by putting inquirers in touch with the best sources of whatever information they may be seeking. The following are the Institutes and Bureaux of the organization:

(i) Commonwealth Institute of Entomology;
(ii) Commonwealth Mycological Institute;
(iii) Commonwealth Institute of Biological Control;
(iv) Bureau of Animal Breeding and Genetic;
(v) Bureau of Animal Health;
(vi) Bureau of Animal Nutrition;
(vii) Bureau of Dairing Science and Technology;
(viii) Bureau of Helminthology;
(ix) Bureau of Horticulture and Plantation Crops;
(x) Bureau of Pastures and Field Crops;

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(xi) Bureau of Plant Breeding and Genetic;

(xii) Bureau of Soil;

(xiii) Forestry Bureau;

Consultative Group on International Agricultural Research (CGIAR)7

The CGIAR is a group of donor countries, development banks, foundations or agencies which are committed to providing funds for international agricultural research. The sponsors of the group are the World Bank, FAO and UNDP. The purpose of the CGIAR organizations is to bring the resources of modern biological, social and economic research to bear more extensively on the problems still hindering agricultural progress in developing countries. The aim is to promote better varieties of food crops and animals, better, methods of cultivation and husbandry in order to achieve dramatic increases in the Third World.

The group supports 8 international agricultural research centres each located in a developing country and each applying its skills to regional and global agricultural problems. The research centres are:

(i) IRRI - The International Rice Research Institute

- Los Banos, Philippines. It aims to increase and stabilize the production of rice in the Third World, both continually developing new varieties and evolving better agricultural systems using rice as a pricipal crop.

(ii) CIMMYT - The International Maize and Wheat Improvement Centre - El Batan, Mexico. It develops research and training patterns which reach out to nearby every major wheat and maize growing country in the world. It collaborates in agricultural projects in developing countries and with research and educational institutions in the developed world.

(iii) IITA - The International Institute of Tropical Agriculture - Ibadan - Nigeria. It is concerned with the development of improved farming systems in the lowland humid tropics especially in Africa. One of its chief concerns is to develope more intensive cropping systems to replace shifting cultivation and to carry out crop improvement programmes for root and tuber crops.

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It cooperates with CIMMYT and IRRI on the adaptation of maize and rice to local requirements.

(iv) CIAT - The International Centre for Tropical Agriculture - Palmira, Colombia. It aims to improve agriculture in the humid lowland tropics in Latin America in particular.

(v) ICRISAT - The International Crops Research Institute for the Semi - Arid Tropics - Hyderabad, India. It studies farming systems and water management methods to benefits farmers in semi-arid tropics and develops better varieties of surghum, pearl millet, chick peas, pigeon peas and groundnuts.

(vi) CIP - The International Potato Centre - Lima, Peru. It is a one crop centre which seeks to improve varieties and to expand the production of potatoes.

(vii) IIRAD - The International Laboratory for Research on Animal Diseases - Kabete, Kenya. It helps the development of effective control measures for internationally important animal diseases through research and training programmes.

(viii) ILCA - The International Livestock Centre for Africa, Addis Ababa, Ethiopia. It is working to increase the output, of animals, and especially of cattle, through improved systems of production and better systems of range management.

The Royal Tropical Institute - The Netherlands [8]

The Institute's Department of Agricultural Research is concerned with the development of and improvement in agricultural planning production and processing, in tropical and sub-tropical countries. The Department's Advisory and Documentation Division offers a wide range of information service which include:

(i) publication of Abstracts on Tropical Agriculture
(ii) selective dissemination of information (SDI) based on profiles of interest.

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(iii) on inquiry service;

(iv) preparation of reviews and bibliographies;

The Division is properly equipped to give help in any question or problem relating to tropical and sub-tropical agriculture - eg. compilation of literature lists expert advice on crops, products, research programme, planning and visits of consulting experts to tropical countries. Also a valuable source of information is the Centre for Agricultural Publishing and Documentation (PUDOC) Wageningen, the Netherlands.

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT NTIS - The National Technical Information Service[9] Washington, DC. U.S.A.

U.S.A.I.D. with the help of National Technical Information Service of the U.S. Department of Commerce is able to facilitate the utilization of U.S. technical and scientific information in developing countries. In 1972 a journal titled Application of Modern Technologies to International Development (AMTID) was created. It contains abstracts of research reports.

U.S.A.I.D. also sponsors a large amount of research in problems related to national development. Studies range from agriculture to economics. The information is disseminated through the publication entitled A.I.D. Research and Development Abstracts (ARDA) which regularly announces research and development studies as they are completed and describes how copies of the studies can be obtained. The publication is mailed to many institutions around the world primarily to universities and government offices in developing countries but also to international agencies and foundations and to staff of A.I.D.

CIDIA (Inter-American Centre for Agricultural Documentation,[10]

It is a specialized centre of IICA (Inter - American Institute of Agricultural Sciences) an inter-governmental organization concerned with the development of the agricultural sector in Latin America and the Caribbean. CIDIA is dedicated to promotion establishment and consolidation of national agricultural documentation, information and Communication structures, aimed at contributing to the integral development of agriculture in the Hemisphere.

As part of its actions CIDIA promoted the creation in 1972 of AGRINTER (the Inter-American Information System for Agricultural Sciences) It is the Coordinating Centre of AGRINTER.

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Some of the IICA - CIDIA main objectives and programmes are to:

(i) assist the countries to strengthen their information infrastructures (national systems);

(ii) assist the countries to plan and implement a regional information infrastructure and to strengthen their capacities in participating in the development of the regional (AGRINTER) and world wide (AGRIS) information systems as full partners. AGRINTER'S services include:

(1) An Agricultural Index of Latin America and the Caribbean - intended to facilitate access to the literature in agriculture and related sciences produced in the region;

(ii) Magnetic Tape Service of the literature in Agriculture.

NATIONAL AGRICULTURAL LIBRARY, U.S. Department of Agriculture. Beltsville, Maryland U.S.A. The National Agricultural Library is one of the principal agencies in the U.S. Department of Agriculture dealing with Scientific and technical information. It provides, researchers, other libraries, and the general public with specialized information in the fields of agriculture and related sciences. Recently the National Agricultural Library was merged into the newly created Science and Education Administration (S.E.A.) The library information component is designated Technical Information systems (TIS) which comprise:[11]

(i) Indexes and abstracts of citations to current food and agricultural science and education publication. (AGRICOLA ie. Agriculture-on-line Access - formarly CAIN)

(ii) The current Research Information System (CRIS), that is, a computarized data base which serves as the documentation and reporting system for U.S. Department of Agriculture research projects and provides technical information to research scientists and current coordinated programme planning information to research managers.

(iii) Current Awareness Literature Service (CAIS);

(iv) Extension Management Information system (EMIS);

(v) Programme Resource Information System (PARIS) - a system for documenting and reporting Federal research resources being utilized for specific problems, commodities and disciplines in different geographical areas.

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(vi) Development of a compilation of solar energy research projects related to agriculture which are being carried out by Federal state, private and non - profit institutions and, where available the results of such projects.

Institute for Scientific Information, Philadelphia U.S.A.

The Institute publishes, among other things Current Contents, a weekly, multidisciplinary, current awareness publications that tell users what is being published by reproducing the titles of contents of important scientific journals from throughout the world. Each Current Contents contains Weekly Subject Index for easy reference and a listing of author's addresses for obtaining reprints. The Weekly Current Contents - Agriculture, Biology and Environmental Sciences present to the reader the titles of papers from more than 1,000 journals reporting the results of world-wide research in the agricultural, biological, environmental, food and veterinary science. This comprehensive service enables scientists, research workers and practitioners to keep up with new developments in their own and related fields. Any subsriber to current contents can operate an SDI SYSTEM by using its weekly Subject Index to identify materials that fit individual profiles. Many institutions in developing countries use Current Contents to supplement their few journals. They only have to request reprints from the authors of every useful item they come across in Current Contents. More sophisticated than Current Contents is ASCATOPICS service which offers individualized SDI services based on personel profiles prepared by the ISI.

International Food Information Service (IFIS)

The IFIS is sponsored by the Commonwealth Agricultural Bureaux (CAB) the Institut fur Dokumentionswesen (IDW), the Institute of Food Technologists (IFT) and the centrum voor Landbouwpublikaties en Landbouwdocumentatie (PUDOC). The objectives of the IFIS are to collect, abstract, collate and distribute information on all matters concerned with research and new developments in Food Science and Technology. The IFIS produces Food Science and Technology Abstracts (FSTA). Besides the printed version, (Abstract journal),a magnetic tape version containing the complete informal of the journal on tape is available for sale. The magnetic tapes can be used to repackage information and to produce special services like SDI and retrospective searches. Photocopies of all papers abstrated in FSTA are also available.

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Undoubtedly, the sources of information described so far offer an wealth of of information if they can be harnessed with the new technique of computer on-line retrieval, this information can be obtained in a few seconds or minutes. The process is simple. The enquirer uses a computer terminal (essentially an electric typewriter capable of transmitting and receiving information signals) linked by telephone to remote computer whose store (data base) can be searched and researched using appropriate computer facilities (the on-line system). The process of getting the information is simple but the cost is formidable as illustrated in column (e) below:

Some agricultural On-Line Data Bases

On line From	Approx. No. of Citations	Upde (No p.a)	Typical Installations	Typical Charges (1977)	Access (1977)
				Connecting Hour	Off Line Citation
(a)	(b)	(c)	(d)	(e)	(f)
AGRICOLA (Agricultural on-Line Access supplier Supplier: National Agricultural Library U.S.A.					
1970	1,000,000	120,000	BRS + DIALOG x ORBIT ⁄	$ 25 $ 35	0.05 0.06
CAB ABSTRACTS Supplier: Commonwealth Agricutural Bureaux					
1973	480,000	130,000	DIALOG	$ 65	$ 0.15
CRIS. (Current Research Information System) Supplier: U.S. Dept of Agriculture					
1974	24,000	24,000	DIALOG:	$ 40	$ 0.10

\+ BRS = Bibliographic Retrieval Services (New York, USA)

x DIALOG is Lockhead Information System (Palo Alto, California)

⁄ ORBIT = On-Line Retrieval Bibliographic Information Time-shared. (Santa - Monica, California)

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Developing countries, Tanzania, being one of them, find it extremely expensive to make use of these data bases. The farther the countries are from the location of data bases, the more expensive it becomes. Most of the data bases are in Europe and North America. Even countries like Australia find on-line services expensive. An Information Specialist had this to say in Ottawa at an International Seminar on Selective Dissemination of Information;

> " We have been aware of the services offered by LOCKHEED, DIALOG AND SDC for some time now. Technically it is possible for any library in Australia to connect via international communications network into either DIALOG or SDC, or both. At the present time it is extremely expensive to implement such services. Communication costs between Australia and the United States amount to $ 144 an hour."15

EXISTING INFORMATION SITUATION IN TANZANIA

Inaccessibility of development literature: the present dilemma of poor availability and waste of resources

Local sources of research information

A Document sub-committee of the working Party on Tanzania National Research Plan appointed in 1970 to examine existing facilities in a representative number of local institutions presented the following findings:

(a) There are a large number of documents which could provide valuable information for Government planning and for research, but which are seldom used because their existence and/or location are unknown.

(b) Most of the Documents fall into one of the two classes:

  (i) items which are published but have only a very limited circulation:-
    - e.g. project feasibility studies and other reports by consultants, international agencies, etc.

  (ii) Ad-hoc, unpublished reports in cyclostyled form by Government Ministries, parastatals, research institutions, etc.

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(c) A large proportion of both types of documents are confidential.

(d) There is no proper system for the circulation, classification and storage of such material. In many cases copies of the documents are put in relevant government files together with miscellaneous correspondence. No record is kept of their location.

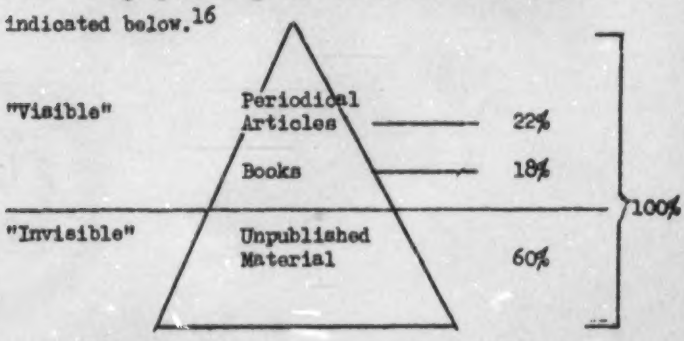
(e) Several ministries and parastatals have "libraries" where reference books, periodicals, serialized Government publications, (e.g. annual reports etc.) are kept. However the libraries receive no copies or have no knowledge of the existence of the documents referred to in the findings. Consequently such documents are seldom used because their existence and/or location is unknown.

(f) It is not unusual for an officer within one division of a Ministry or Parastatal to be ignorant of a report produced by another officer in the same office.

The inaccessibility of development literature, though an international problem, is critical in Tanzania. The implications can be summarized as follows:

(a) Institutions wishing to keep abreast of new development literature must go to a very great expense to find out what exists and then obtain it.

(b) As a result of the above many institutions and individuals have no means of knowing the existence of many items that would be directly reluctant to their work, nor is there any single place to which they may refer with any degree of certainty of finding them. In general unpublished vis-a-vis published material form a large percentage of "invisible" literature as indicated below.[16]



A consultant Mission report (1975) by FAO on the Establishment of a National Agricultural Information System in Tanzania made the following major recommendations with regard to dissemination of agriculture information.[15]

That priority should be given to:

(i) the collection, indexing and dissemination of Tanzanian documents;

(ii) the creation of a flow of information from and to the regions;

(iii) production of information services which suit the requirement of the users.

(iv) Provision of aggressive (active) information services..

There is an urgent need for a properly functioning national agricultural system with a well established, documentation centre because users demand for such service is justified as shown by the FAO Consultant's estimates:

TABLE I

ESTIMATED NUMBER OF INSTITUTIONAL USERS

Type of institution	Total	Dar es Salaam	Regions
Ministries	10	9	1
Regional Offices	20		20
District Offices	70		70
Ministry of Agriculture parastatals	40	24	16
Other parastatals	12		
Other agricultural institutions	10		
Education and training institutions	95	13	82
Research institutions	24	2	22
International projects	30	12	18
Total	311	60	229

...../15..

TABLE II

ESTIMATED NUMBER OF INDIVIDUAL USERS

	Institution	Number	Estimated % in the regions
1)	Ministry of Agriculture	693	
2)	Other Ministries	500	
3)	Regional offices	80	100
4)	District offices	280	100
5)	Ministry of Agriculture parastatals	829	40
6)	Other parastatals	65	
7)	Cooperatives	100	
8)	Other agricultural organisations	900	
9)	Academic staff Faculty of Agriculture	53	100
10)	Academic staff other faculties	100	
11)	Staff of other education and training institutions	200	70
12)	Students, Faculty of Agriculture	279	100
13)	Students other faculties	200	
14)	Other students	200	70
15)	Research workers	350	100
16)	Technical assistants	100	40
	Total	4,929	33% to 50%

To satisfy the needs of each institution and individual is, of course not an easy task. Local resources (libraries, documentation centres, archives, research institutions, etc) must be augmented with international resources.

However, and this is crucial, international or regional resources cannot be adequately exploited unless there is first and foremost a well organised national network of information sources with a well established information infrastructure which carry out the functions of the information - transfer process. A checklist of requirements for information infrastructure is shown at the end of this paper.

THE NEED FOR AN INPUT CENTRE FOR AGRIS

In the Eastern Africa Region the Nairobi based Coordinating Centre for Regional Information Training, (CRIT) in cooperation with UNESCO, British Council, FID, and other international organizations) has been instrumental in arranged various courses, seminars, conferences, workshops on information science.

In May 1977 CRIT (in cooperation with FAO, East Africa Academy, International Development Research Centre (IDRC). Centre for Agriculture Publishing and Documentation (PUDOC), CAB, International Institute of Tropical Agriculture (IITA) and IFIS) conducted a Training course on AGRIS and related information services at Muguga, Kenya. Tanzania was among the 30 invited participants. The aim of the course was to encourage more centres to participate in AGRIS and make full use of the service. At that time, very few countries in Eastern Africa, Tanzania included, had established input centres for AGRIS. Up to the present time, there is no official input centre for AGRIS in Tanzania. Needless to say, the establishment of such a centre is very much overdue. Once the input centre has been established, Tanzania will be able to send /Centre to the AGRIS coordinating/bibliographic information on material emanating from research findings in Tanzania for inclusion in AGRINDEX. Apart from Tanzania letting the world, know about her contribution in agriculture and related field, she will in turn benefit from the use of research findings of other countries as well as secure other benefits of the AGRIS system - e.g. FAO's assistance in training, and the establishment of agricultural information.

Agricultural information is one aspect of information for development. It is vital that Tanzania should support any international and, in particular regional plans in the development of information services. Under again the umbrella of the Coordinating Centre for Regional Information Training, an important meeting will take place in Nairobi from 2nd - 4th April 1979. The meeting will, among other things, discuss the vital issue concerning the draft project for a Regional Network of Scientific and Technical Information in Eastern Africa. The project is intended to implement in Eastern Africa the UNISIST Programme by helping the development of national information infrastructure and strengthen and coordinate scientific and technical information in each country of the sub-region. The application to UNDP for financial assistance for this project should have been submitted in 1975 but this was not possible because of failure to obtain endorsement from as many countries as possible. The failure is due to the fact that most member states, including Tanzania have not established national focal points and UNISIST National Committee in line with UNESCO's guidelines sent to member states in 1973.

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For example, January 1978 Unesco list indicated that the following countries in Africa had either established national Focal Points or Unisist National Committees. The countries are, Ghana, Ivory Coast, Morocco, Nigeria, Senegal and Tunisia. UNESCO believes that only after establishing strong national information structures at regional level can coordinated information structures at regional level be developed. There is therefore an urgent need for Government of Tanzania to officially designate a national focal point.

The desperate situation caused by the non-existence of National Focal Points is clearly summarized by CRIT's comment:

> " The Regional Committee for Development of Information Services in Eastern Africa acts as the Regional Focal Point or Coordinating Office. However so far, its effectiveness has been teribly frustrated because there is nothing at national level to be coordinated. As many reports on development of information services in Eastern Africa show, in most East African countries steps must be taken at the national level first. This is absolutely necessary before they can participate in a regional network. Such a network must be based on sound and durable national structures (ie. national focal points, UNISIST national committees and active associations) and a genuine desire for cooperation in each country. The Regional network cannot make up for national shortcomings. It can only strengthen and accelerate national processes, not replace them." 19

THE ROLE OF LIBRARIES IN AGRICULTURAL RESEARCH

Libraries should be organized in such a way that they support the the activities of the Ministry of Agriculture. Since agriculture is the main stay the economy . . libraries in agricultural research institutes must disseminate research findings to planners and decision makers as well as to farmers and peasants.

According to the 1974 Directory of Agricultural Research Institutes in Tanzania there were, for example 9 Agricultural Research Institutes and 23 Agricultural Experimental Stations, engaged in Crop Research activities. It is important that a copy or more of non-confidential research reports should be deposited in libraries for future reference and in order to avoid costly duplication.

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For easy reference, the publications must be well organised.

As there are many Agricultural Research Institutes it is essential, that research programmes should be coordinated. Such coordination will also facilitate the collection of research findings. It is gratifying to note from the 1974 Directory of Research Institutes in Tanzania that the Ministry of Agriculture has already realized the need for such coordination. At the National Meeting of Directors of Agricultural Research Institutes held in Mbeya on 23rd May 1974 proposals for setting up National Crop Research Coordinating Committees were endorsed. In the past Agricultural Research Institutes functioned as independent institutions. There was tittle effective coordination of research programmes between many of the Institutes engaged in similar type of research.

Thus in 1974 proposals were made for the setting up of an organ which would be responsible for coordinating research projects mobilizing research findings and disseminating research results at national level. The coordinating committees which should have been in operation during the 1974/75 cropping seasons are responsible for:

(a) Coordinating and preparing a National Crop Research Plan;

(b) evaluating, editing and reporting research results;

(c) disseminating research findings through publications, meetings and extension media;

(d) development of manpower plan for respective National Crop Research Programmes.

The role of libraries in Agricultural Research Institutes is very special in that they exist to serve the needs of research brokers and other specialists in government departments and institutes. They must communicate research findings from the researcher to the user or practictioner. Such research findings must reach the peasants in rural areas and must be in a language and level which these people can understand because research findings are usually written in difficult and technical languages of researchers.

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This problem has been discussed many times all over the world. In 1972, to cite an example, a workshop was held at the University of Nairobi research for production dissemination and utilization. It was noted, among other things, that research in Kenya was characterized by a lack of communication and coordination between various research bodies. This resulted in:[21]

(a) research duplication and overlap by researchers in the same field;
(b) very poor dissemination of research findings at a level and frequency which would be useful to those who could use the results - e.g. policy makers and practitioners in the field.
(c) lack of public awareness of various research findings and programmes.

In order to get research findings to the practitioners, that is, farmers or peasants, the Nairobi workshop recommended that they there should be research brokerage - that is, translating and packaging research results in understandable language using proper channels.

Factors affecting good library services

For libraries to play an effective role, they must have, among other things, adequate funds, properly trained manpower, and suitable buildings with adequate facilities. These are vital components for the successful functioning of libraries.

(a) Funds

Compared with other ministries, the Ministry of Agriculture sets aside a substantial sum of money for libraries for example the library vote for 1977/78 was T.Shs. 700,000, followed by those of the Ministry of Education (T.Shs. 510,000), Ministry of Defense and National Service (T.Shs. 240,000 as contrasted with T.Shs. 12,000 for Ministry of Industry, T.Shs. 9,500 for the Ministry of Trade and T.Shs. 5,000 for the Ministry of Capital Development. The library at the Headquarters of the Ministry of Agriculture in Dar es Salaam does all the ordering for books and periodicals for up-country libraries. Undoubtedly 700,000 T.Shs. for all libraries is far from adequate in view of the importance of agriculture to the nation. In 1975, for instance, a total of 1,778 books and about 200 titles of scientific and technical journal were ordered for Training Institutes and Research Centres.

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With the exception of the library at the Head quarters which acquired about 400 titles, most of Institutes and Research Centres received less than 100 books annually.

(b) Staffing

Lack of an adequate number trained library staff is a perennial problem for the Ministry of Agriculture. According to the 1969 Annual Library Report it was proposed that there should be one librarian, 2 senior library Assistants and one clerical Assistant for the Headquarters library. The situation has not improved since then. The Ministry does not have a single professional librarian. On several occasions, Tanzania Library Service has helped the Ministry by seconding to it some of her staff. This arrangement has been made as a stop-gap measure only. The Ministry really ought to have a concrete training programme for professional librarians, para-professionals and other supporting staff.

(c) Library Buildings

The library building at the Headquarters of the Ministry is now too small to allow for adequate library services to be rendered to Headquarters staff and up-country Institutes. This urgent need for expansion was felt as far back, as 1969. Many libraries of Ministry's Institutes face a similar problem.

THE URGENT NEED OF STRENGTHENING NATIONAL AND INTERNATIONAL RESEARCH AND INFORMATION IFRASTRUCTURE [22]

The 1973 FAO conference decided that agricultural research should be a major topic for discussion at the 18th Conference in 1975. It was resolved that research must be viewed as a vital national resource, an essential component of the development process, both to raise productivity in the short term, and to prepare and orient the longer - term transformation of a society to meet future exigencies.

STRENGTHENING NATIONAL RESEARCH CAPABILITIES

The inadequancy of investment in agricultural research in many developing countries was regrettably noted. Member states were urged to strengthen their national agricultural research and not depend wholly on international agricultural research for the following main reasons:

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(a) Although there is undoubtedly a considerable stock of knowledge not being adequately utilized, much of this originates from industrialized countries and is often unsuited to the needs of developing countries without further adaptive research for social as well as technical reasons. The chances of success in its utilization are therefore greatly diminished where a country lacks a sound multi - disciplinary research capability.

(b) Numerous commodities and problems important to developing countries require research which is not covered by international or developed country research programmes and given resource constraints, cannot be covered in the future. Countries must build their own research capabilities to respond to the challenges

The NEW International Economic Order (NIEO) and transfer of technology:

As we know, the establishment of a New International Economic Order is "based on equity, sovereign equality, interdependence, common interest and cooperation among all states, irrespective of their economic and social systems which shall correct inequalities and redress existing in justices". The NIEO hopes to eliminate the widening gap between the developed and the developing countries and ensure steadily accelerating economic and social development and peace and justice for present and future generations".[23]

Section IV of the Programme of Action on the Establishment of NIEO dealing with Transfer of technology has the following objectives:

(a) Formulation of an international code of conduct for the transfer of technology corresponding to needs and conditions prevalent in developing countries;

(b) Giving access on improved terms to modern technology and to adapt that technology, as appropriate to specific, economic., social and ecological conditions and varying stages of development in developing countries;

(c) Expanding significantly the assistance from developed to developing countries in research and development programmes and in the creation of suitable indigenous technology;

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(d) Adapting commercial practices governing transfer of technology to the requirements of the developing countries and preventing abuse of the rights of sellers;

(e) Promoting international cooperation in research and development in exploration and exploitation, conservation and the legitimate utilization of natural resources and all sources of energy.

Under the NIEO conceptual framework, there is ample scope for the transfer of technology from the developed to developing technology from the developed to developing countries.

The 1975 FAO Conference while discussing the issue of strengthening national agricultural research noted the following common weaknesses of national research systems in developing countries.[24]

(a) Research is chronically under-financed.

(b) Research is often not well aligned to national need and priorities due to poor communication and understanding between planners, administrators and research directors and in-adequate machinery for review and appraisal of the validity of research programmes to changing national goals or objectives.

(c) Research organization is frequently weak and fragmented between various ministries, departments, universities and semi-autonomous agencies. Liason between these is often very poor.

(d) There is an acute shortage of trained scientists particularly those with research skills.

(e) Conditions of service, lack of equipment immobility and inadequate supporting staff often frustrate sound research.

(f) As a result of (a) most scientists in developing countries are starved of funds for travel or publication and are therefore poorly informed as to the state of knowledge emanating from international or other institutes outside (and sometimes even within) their own countries.

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(g) Salaries and career prospects fail to provide adequate initiatives to keep young scientists, nor do they have sufficient freedom and flexibility to publish in reputable journals. This together with working frustrations is a manor cause of the "brain drain".

(h) Linkages between research institutions and extension and other services essential to sucessful implementation of their results are poor. Researchers blame extension services for this but their results are often presented in a way which has little meaning, either because of failure to integrate biological and social economic information, or because they have insufficient relevance to conditions on the farm.

In Tanzania, for example, K.J.B. Karegero and J.De Vries have this to say: "Researchers tend to blame the agricultural extension service which has been criticized as poorly organized, poorly planned, poorly funded and poorly staffed.... Extension workers naturally try to place the blame instead on the 'traditionalist' and 'conservative' farmers. They argue that farmers are like a sick man who must be forced to eat, i.e. accept new practices for his own good. The blame may not rest with farmers or the extension service, but with research recommendations that extension is trying to push."

FAO has made the following major proposals regarding the improvement of national research organization and management:[26]

(a) An essential first step is the <u>establishment of internal machinery</u> linking national planners, ministries responsible for agricultural development research directors, universities and the private sector, for example through the medium of a <u>National Agricultural Research Councils</u>, with links to <u>National Science Councils</u> where these exist. Such a body can provide a focal point, through its secretariat, for research and training linkages with external agencies.

(b) A further step towards reducing fragmentation of effort which has already been taken by several developing countries in creation of a central national

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agricultural research organization, grouping all main physical, biological and social science fields within an umbrella organization which has sufficient strength and flexibility to enable research to be undertaken.

Need for network of cooperating libraries and documentation centres in Tanzania

At present, because of constraints, particularly financial constraints under which various libraries are working each tends to serve its own clientele. Undoubtedly much better use of available resources would be possible through cooperation among libraries. Such cooperation requires the development of appropriate tools, the provision of certain equipment e.g. photocopiers, and the active support of the authorities under which libraries function. Building a comprehensive centralized information service is now impossible. From the experience of many countries, it is now clear that the centralised service can succeed only if there is a huge investment, not only in books and journals but more importantly a substantial investment in information specialists. Centralization appeared possible many years ago but now that there is "information explosion", the building of a comprehensive information service under one roof would be very expensive and beyond the resources of the nation. There is therefore the need for building a decentralized network of cooperating libraries and the responsibility for providing a national service in information should be delegated sector-by-sector to the most appropriate institutions. However such information services require coordination. The decentralized network concept requires a central focus which will develop norms and standards of service, construct the necessary tools for cooperation (e.g. the production of a national union list of the journal (and if possible book) holdings of the cooperating libraries and the development of an appropriate procedure for handling inter-library cooperation may be voluntary but to be very effective it should be formalized. A formal agreement ought to be part of the librarians' parent authorities to participate in the network and to offer quick responses to bona fide enquiries from users from all over the country.

STRENTHENING INTERNATIONAL RESEARCH

The benefits of the international research system. International research institutes or centres offer special advantages to developing countries:-

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(a) They are the only group of political independent institutes charged with agricultural research aimed at priority problems of wide importance to developing countries.

(b) They are able to take risks. Because of their wide base of support, and because they are expected by their supporters to be in the vanguard of innovation they are more flexible to test our new methods than is possible with many government supported institutions.

(c) Their geographical coverage is much wide than that of national institutes.

(d) They offer more and better training facilities for scientists.

In exploiting international resources using international information network international cooperation for information transfer is essential. International information networks have the following general characteristics: [27]

(a) They are systems in which members States are not passive clients but are active participants in gathering, processing and dissemination of information

(b) Their organisationaly framework can be summarised as follows.

(i) each participating Member State, through its national institutions, is responsible for identification and collection of information produced within its borders and for selection of information to be transmitted to the international system;

(ii) information received by the system is processed and equitably made available to participating Member States.

(iii) each Member state again through its own institutions, selects the information it needs from the system and is responsible for dissemination and use at the national level.

It is only through this kind of collaboration between member States and international organization that international information networks can functions.

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In facilitating the exploitation of national and international resource UNESCO is playing a leading role. Through the UNISIST programme which it launched in 1971, UNESCO intends to attain the following five objectives:-

(a) the establishment of national regional and international information policies;

(b) the establishment of norms and standards;

(c) the creation of conditions for systems interconnection;

(d) the establishment of training facilities and;

(e) the provision of assistance to Member States for the development of national information infrastructures.

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INFORMATION INFRASTRUCTURE: A CHECKLIST

I. Governmental Policy for Information

A. Does the government have a national policy for scientific research and development?

B. If so, does it have a national policy for scientific and technical information?

C. Is there a government agency serving as a focus for information policy formulation?

D. What percent of the national research and development budget is spent on scientific and technical information?

II. Manpower Resources

A. Existing

1. What is the number of trained personnel? What is the estimated national need?

2. To what extent has their training been indigenous; to what extent outside the country?

3. Are the information and library professions, and information specialists in other professions suitably compensated?

4. Are there nationally recognized standards for education and training in the information science?

B. Potential for Training Manpower

1. What is the capacity of indigenous training institutions?

2. Is there fiscal support for trainees-within, or outside the country?

3. Do U.N. agencies or nongovernmental organizations (including private companies) sponsor indigenous training programs? Fellowships for Training overseas?

III. Information Resources and facilities

A. Libraries, specialised information and documentation centre

1. What is the volume, character, and quality of information resources? Have they been selected in relation to development needs?

2. Are they appropriately distributed geographically in in relation to user needs?

3. Have they been adequately organised for use?

4. What types of information services do the centres reach them?

5. What populations are being seved? How do the centers reach them?

6. What is the level of fiscal support given these institutions?

B. Publication Capabilities

1. What is the status of the scientific and technical periodical press? Book publishing?

2. What abstracting and indexing services exist?

3. What is the status of scientific and technical book import?

4. What translation capabilities exist in the sciences and technologies?

C. Computer Capabilities

1. What resources (hardware, trained manpower) exist?

2. What is the overall status of computer application?

3. Are proposed tasks significant and large scale enough to justify computer application? Can economies be demonstrated?

IV. Institutional Resources

A. What governmental ministries and programs have roles in technology transfer through information?

B. What regional or intergovernmental economic development organisation operate within the country for the same purpose?

C. What nongovernmental organizations, including scientific and technical societies, have related interests?

D. Do the universities and technical colleges provide services to industry for technology transfer?

E. What role does industry, including multinational companies, play in effecting technology transfer?